

Abstract of the Disclosure

5 A fuel activation assembly disposed between two fuel compartments in a fuel cell,  
such as a direct methanol fuel cell. The fuel activation assembly comprises a substrate  
with apertures for securely attaching a plurality of membrane electrode assembly (MEA)  
segments. Each MEA segment has a proton exchange membrane (PEM) sandwiched  
between two electrodes to allow protons produced in one fuel compartment to migrate to  
the other fuel compartment through the aperture. If the fuel cell becomes non-functioning  
due to the damage in the fuel activation assembly, it is possible to replace only the  
10 defective MEA segments. With a number of MEA segments, the electrodes on the two  
sides of the PEM can be electrically connected in series or in parallel or in a combination  
thereof.